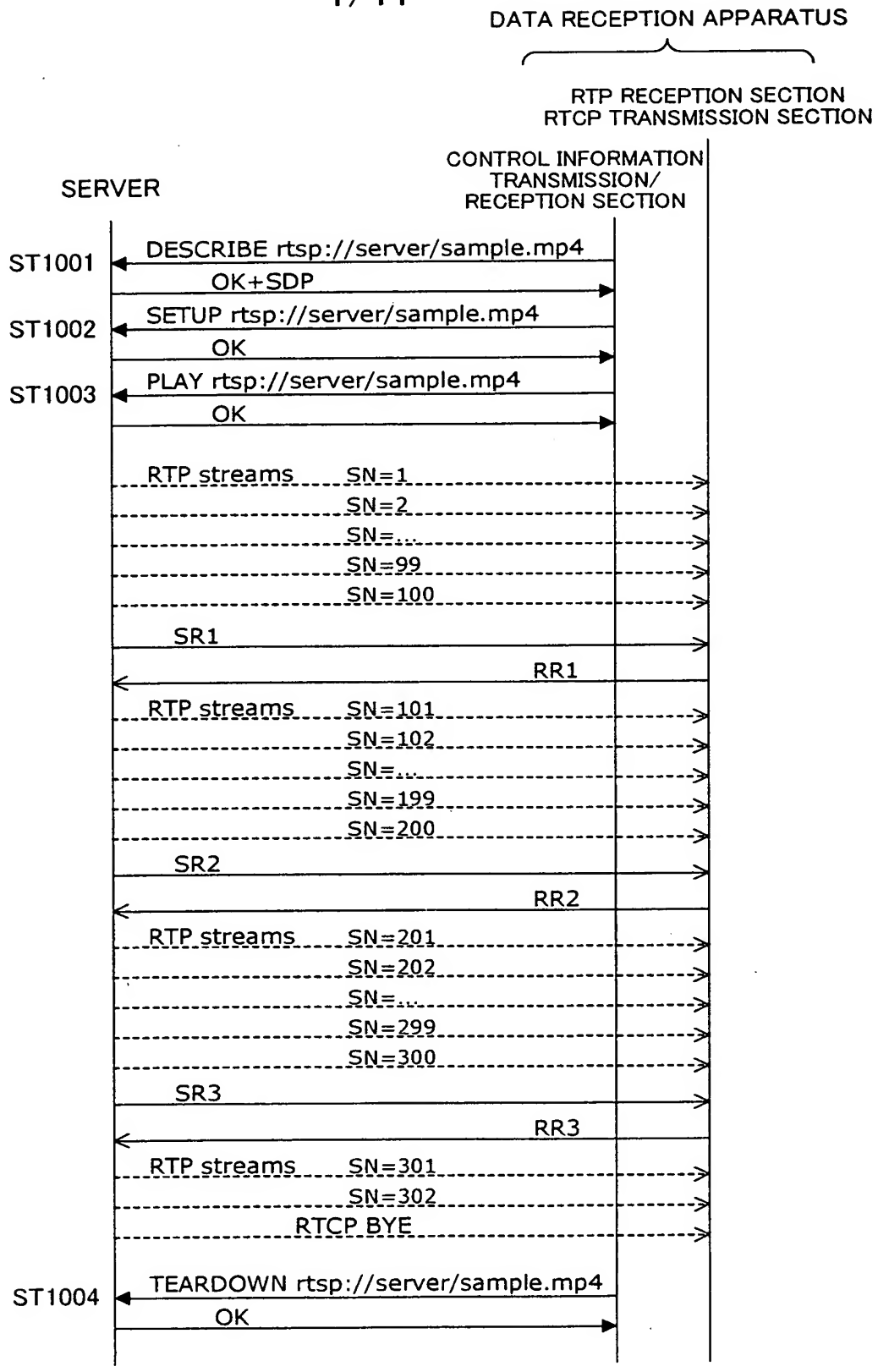
DATA RECEPTION APPARATUS
RTP RECEPTION SECTION
RTCP TRANSMISSION SECTION
CONTROL INFORMATION TRANSMISSION/ RECEPTION SECTION
SERVER
ST1001
DESCRIBE rtsp://server/sample.mp4
OK+SDP
ST1002
SETUP rtsp://server/sample.mp4
OK
ST1003
PLAY rtsp://server/sample.mp4
OK
RTP streams SN=1
SN=2
SN=...
SN=99
SN=100
SR1
RR1
RTP streams SN=101
SN=102
SN=...
SN=199
SN=200
SR2
RR2
RTP streams SN=201
SN=202
SN=...
SN=299
SN=300
SR3
RR3
RTP streams SN=301
SN=302
RTCP BYE
ST1004
TEARDOWN rtsp://server/sample.mp4
OK

FIG. 1

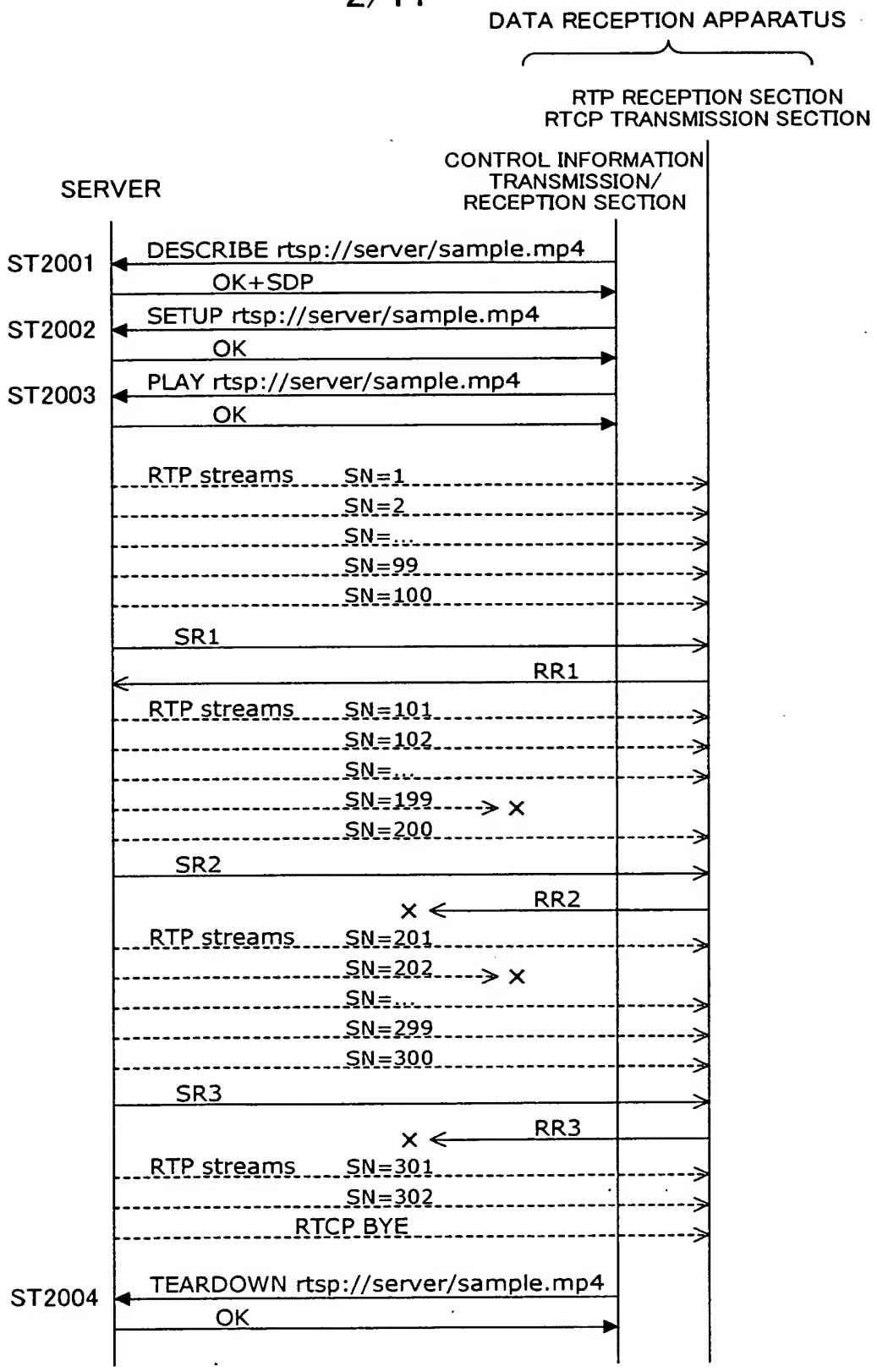
DATA RECEPTION APPARATUS
RTP RECEPTION SECTION
RTCP TRANSMISSION SECTION
CONTROL INFORMATION TRANSMISSION/ RECEPTION SECTION
SERVER
ST2001
DESCRIBE rtsp://server/sample.mp4
OK+SDP
ST2002
SETUP rtsp://server/sample.mp4
OK
ST2003
PLAY rtsp://server/sample.mp4
OK
RTP streams SN=1
SN=2
SN=...
SN=99
SN=100
SR1
RR1
RTP streams SN=101
SN=102
SN=...
SN=199
SN=200
SR2
RR2
RTP streams SN=201
SN=202
SN=...
SN=299
SN=300
SR3
RR3
RTP streams SN=301
SN=302
RTCP BYE
ST2004
TEARDOWN rtsp://server/sample.mp4
OK

FIG. 2

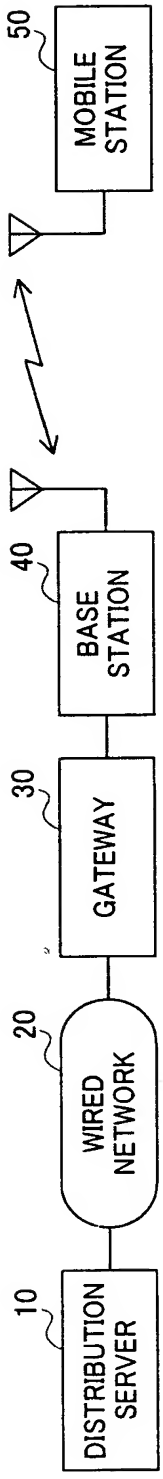
50
MOBILE STATION
40
BASE STATION
30
GATEWAY
20
WIRED NETWORK
10
DISTRIBUTION SERVER

FIG. 3

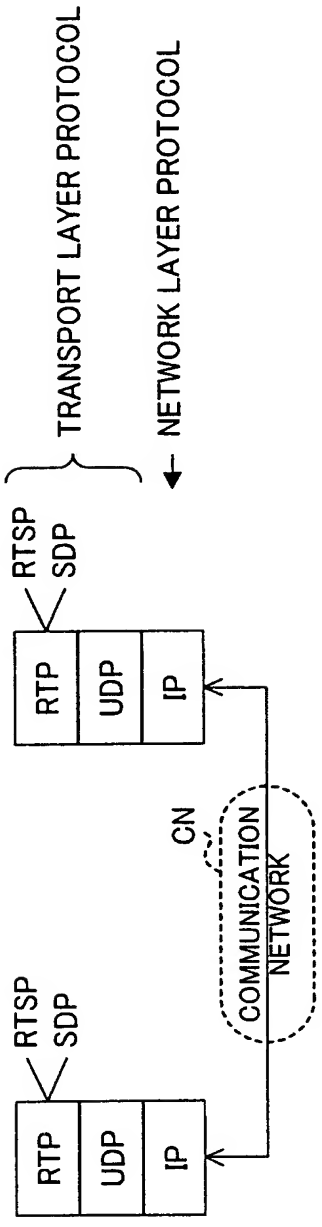
TRANSPORT LAYER PROTOCOL
NETWORK LAYER PROTOCOL
RTSP
SDP
RTP
UDP
IP
CN
COMMUNICATION NETWORK
RTSP
SDP
RTP
UDP
IP

FIG. 4

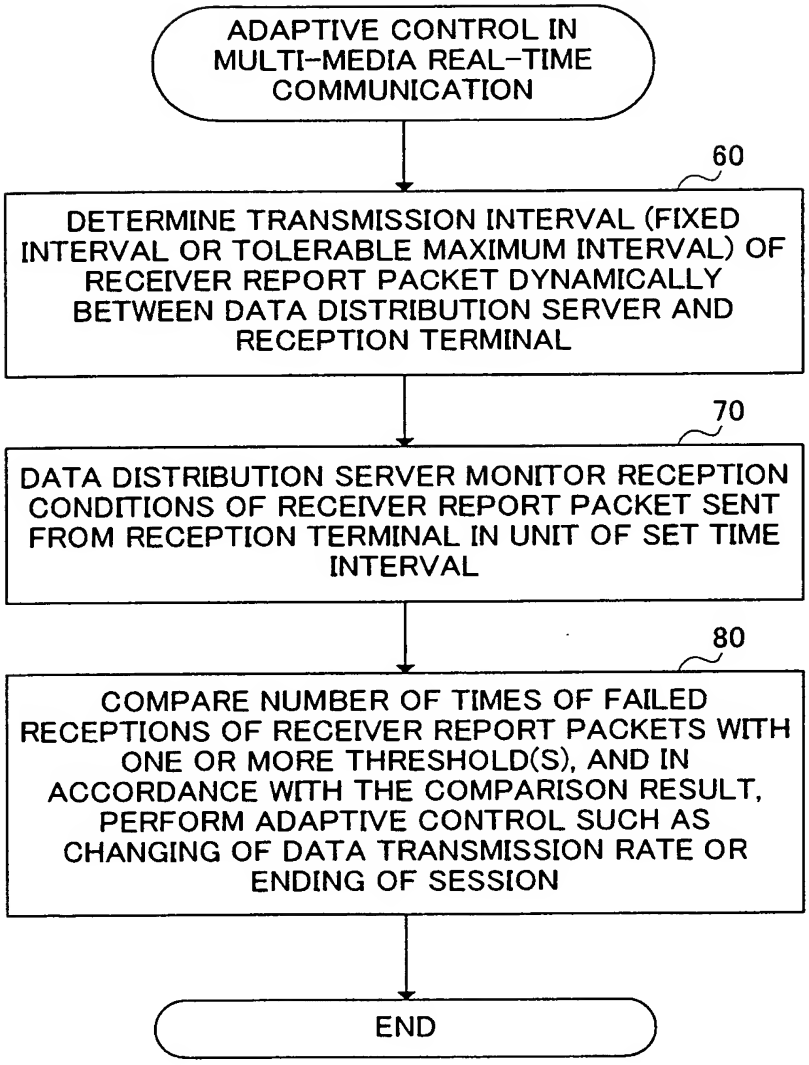
ADAPTIVE CONTROL IN MULTI-MEDIA REAL-TIME COMMUNICATION
60
DETERMINE TRANSMISSION INTERVAL (FIXED INTERVAL OR TOLERABLE MAXIMUM INTERVAL) OF RECEIVER REPORT PACKET DYNAMICALLY BETWEEN DATA DISTRIBUTION SERVER AND RECEPTION TERMINAL
70
DATA DISTRIBUTION SERVER MONITOR RECEPTION CONDITIONS OF RECEIVER REPORT PACKET SENT FROM RECEPTION TERMINAL IN UNIT OF SET TIME INTERVAL
80
COMPARE NUMBER OF TIMES OF FAILED RECEPTIONS OF RECEIVER REPORT PACKETS WITH ONE OR MORE THRESHOLD(S), AND IN ACCORDANCE WITH THE COMPARISON RESULT, PERFORM ADAPTIVE CONTROL SUCH AS CHANGING OF DATA TRANSMISSION RATE OR ENDING OF SESSION
END

FIG. 5

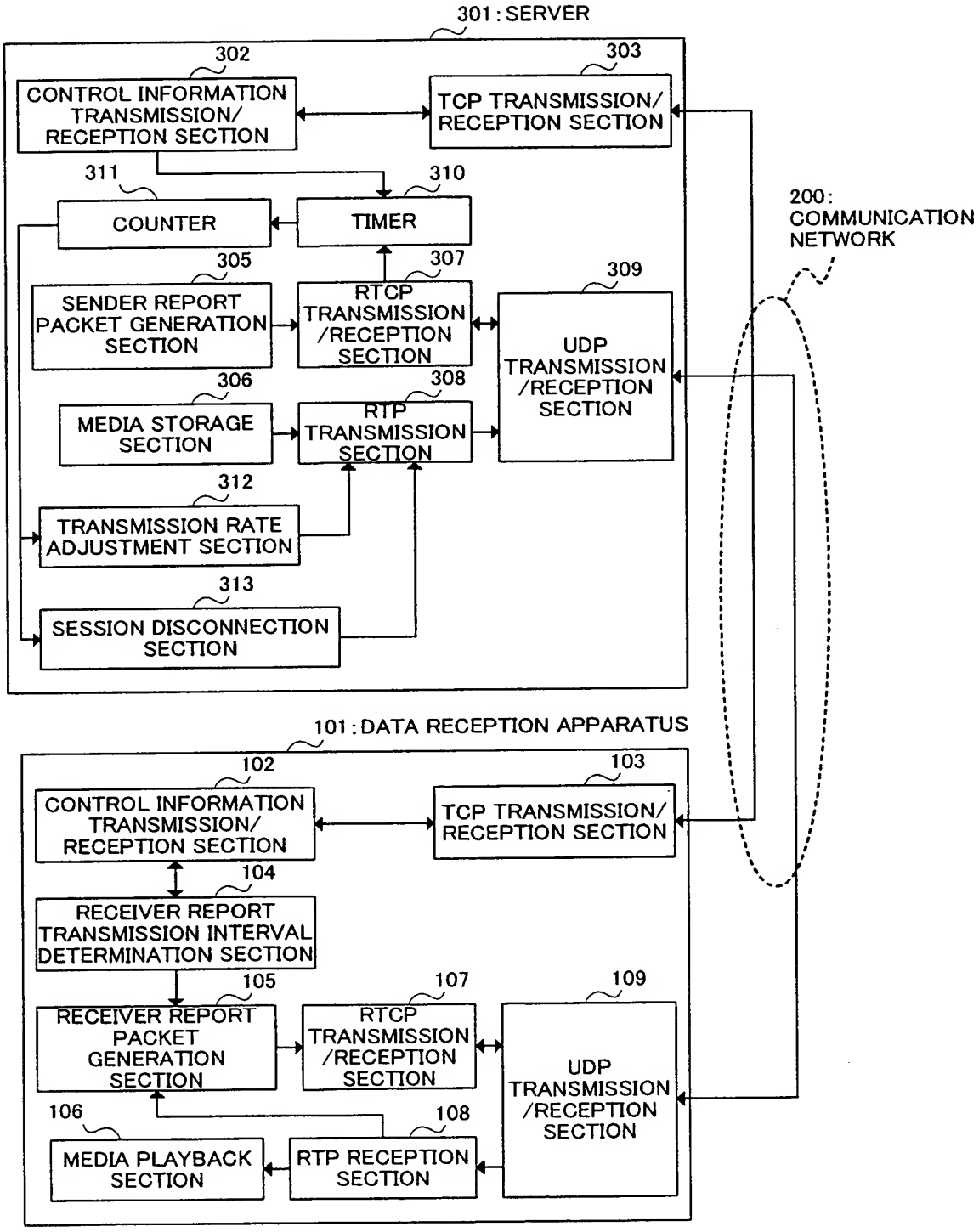
301 : SERVER
302
CONTROL INFORMATION TRANSMISSION/ RECEPTION SECTION
303
TCP TRANSMISSION/ RECEPTION SECTION
311
310
COUNTER
TIMER
200: COMMUNICATION NETWORK
305
307
309
SENDER REPORT PACKET GENERATION SECTION
RTCP TRANSMISSION /RECEPTION SECTION
UDP TRANSMISSION /RECEPTION SECTION
306
308
MEDIA STORAGE SECTION
RTP TRANSMISSION SECTION
312
TRANSMISSION RATE ADJUSTMENT SECTION
313
SESSION DISCONNECTION SECTION
101 : DATA RECEPTION APPARATUS
102
103
CONTROL INFORMATION TRANSMISSION/ RECEPTION SECTION
TCP TRANSMISSION/ RECEPTION SECTION
104
RECEIVER REPORT TRANSMISSION INTERVAL DETERMINATION SECTION
105
107
109
RECEIVER REPORT PACKET GENERATION SECTION
RTCP TRANSMISSION /RECEPTION SECTION
UDP TRANSMISSION /RECEPTION SECTION
106
108
MEDIA PLAYBACK SECTION
RTP RECEPTION SECTION

FIG. 6

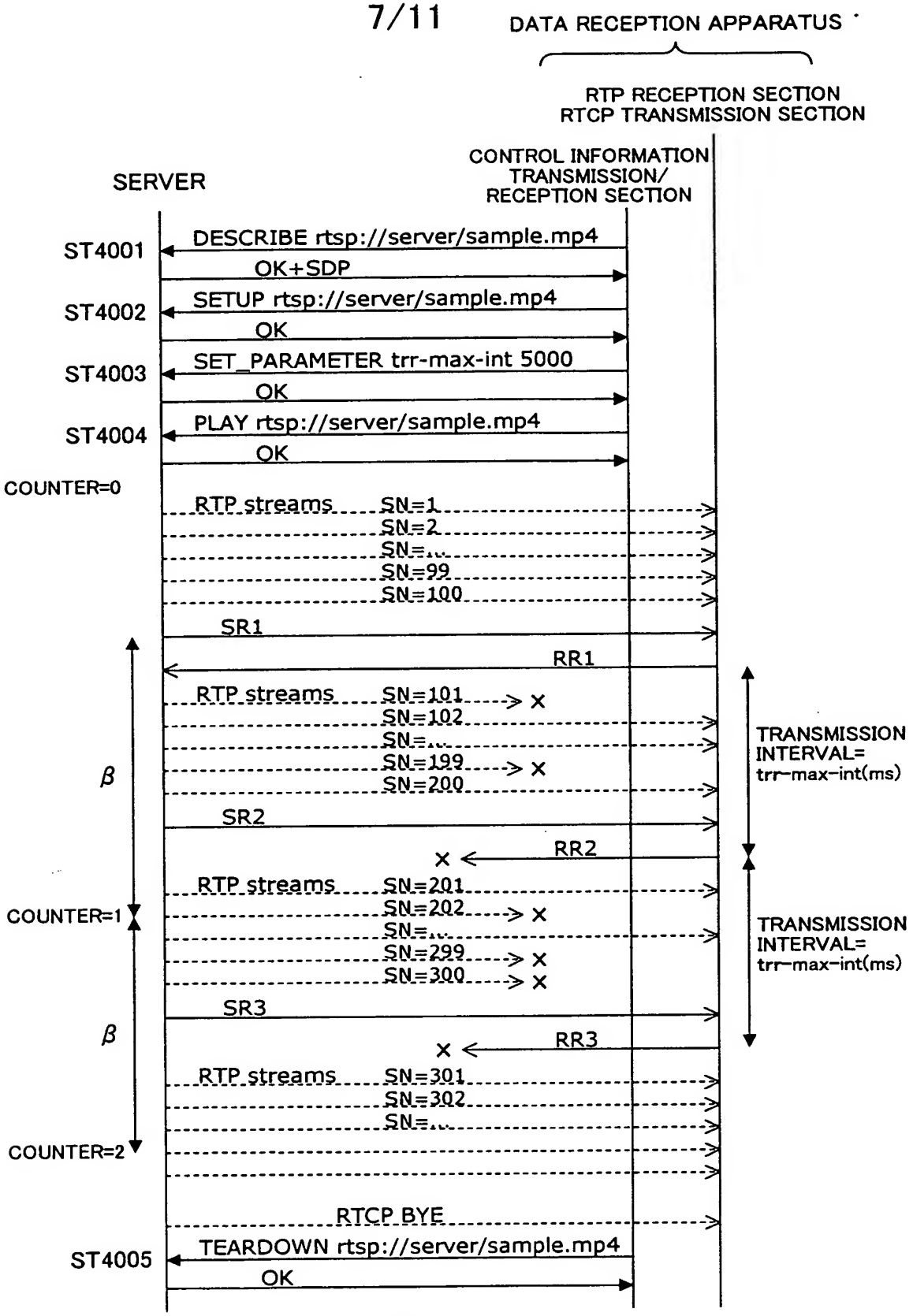
DATA RECEPTION APPARATUS
RTP RECEPTION SECTION
RTCP TRANSMISSION SECTION
CONTROL INFORMATION TRANSMISSION/ RECEPTION SECTION
SERVER
ST4001
DESCRIBE rtsp://server/sample.mp4
OK+SDP
ST4002
SETUP rtsp://server/sample.mp4
OK
ST4003
SET_PARAMETER trr-max-int 5000
OK
ST4004
PLAY rtsp://server/sample.mp4
OK
COUNTER=0
RTP streams SN=1
SN=2
SN=...
SN=99
SN=100
SR1
RR1
RTP streams SN=101
SN=102
SN=...
SN=199
SN=200
β
SR2
RR2
TRANSMISSION INTERVAL= trr-max-int(ms)
RTP streams SN=201
SN=202
SN=...
SN=299
SN=300
COUNTER=1
SR3
β
RR3
TRANSMISSION INTERVAL= trr-max-int(ms)
RTP streams SN=301
SN=302
SN=...
COUNTER=2
RTCP BYE
ST4005
TEARDOWN rtsp://server/sample.mp4
OK

FIG. 7

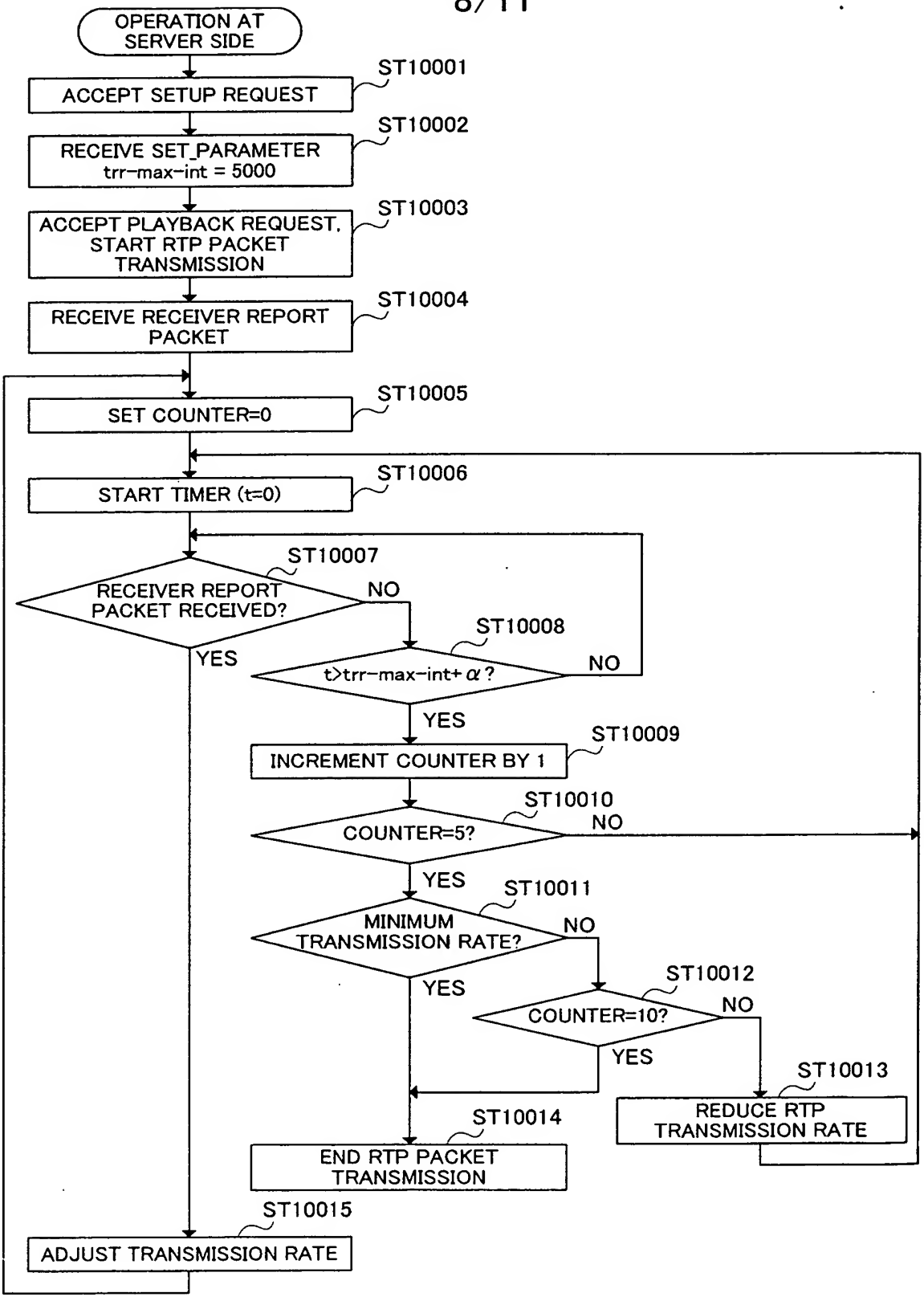
OPERATION AT SERVER SIDE
ST10001
ACCEPT SETUP REQUEST
ST10002
RECEIVE SET_PARAMETER trr-max-int = 5000
ST10003
ACCEPT PLAYBACK REQUEST, START RTP PACKET TRANSMISSION
ST10004
RECEIVE RECEIVER REPORT PACKET
ST10005
SET COUNTER=0
ST10006
START TIMER (t=0)
ST10007
RECEIVER REPORT PACKET RECEIVED?
NO
YES
ST10008
t>trr-max-int+α ?
NO
YES
ST10009
INCREMENT COUNTER BY 1
ST10010
COUNTER=5?
NO
YES
ST10011
MINIMUM TRANSMISSION RATE?
NO
YES
ST10012
COUNTER=10?
NO
YES
ST10013
REDUCE RTP TRANSMISSION RATE
ST10014
END RTP PACKET TRANSMISSION
ST10015
ADJUST TRANSMISSION RATE

FIG. 8

RTSP REQUEST FROM DATA RECEPTION APPARATUS TO SERVER

```
SET_PARAMETER  rtsp://server/example.mp4 RTSP/1.0
CSeq: 3
Session: 57751252

trr-max-int=5000
```

FIG. 9

RTSP RESPONSE FROM SERVER TO DATA RECEPTION APPARATUS

```
RTSP/1.0  200  OK
CSeq: 3
Session: 57751252
```

FIG. 10

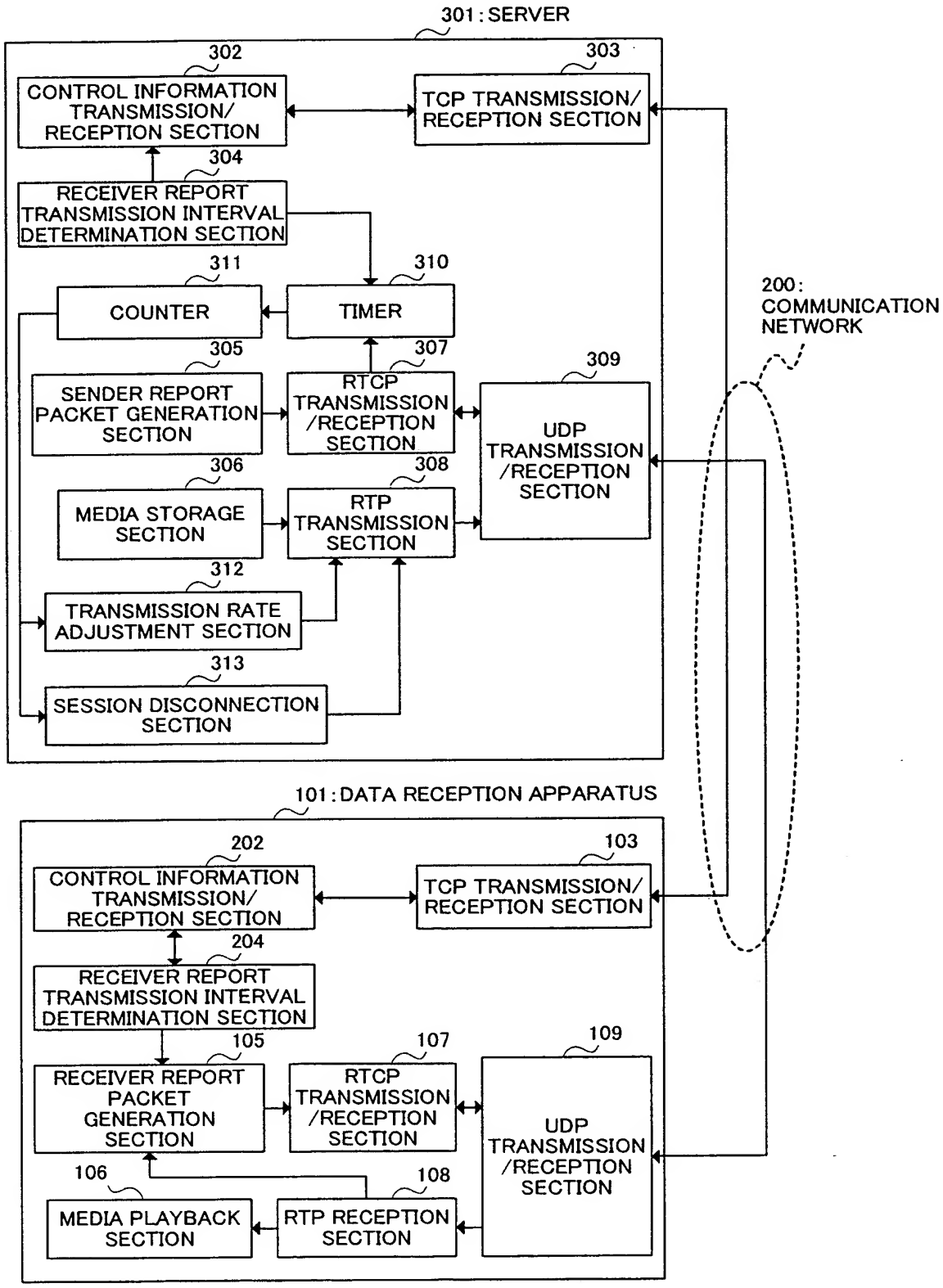
301 : SERVER
302
CONTROL INFORMATION TRANSMISSION/ RECEPTION SECTION
303
TCP TRANSMISSION/ RECEPTION SECTION
304
RECEIVER REPORT TRANSMISSION INTERVAL DETERMINATION SECTION
311
COUNTER
310
TIMER
305
SENDER REPORT PACKET GENERATION SECTION
307
RTCP TRANSMISSION /RECEPTION SECTION
309
UDP TRANSMISSION /RECEPTION SECTION
306
MEDIA STORAGE SECTION
308
RTP TRANSMISSION SECTION
312
TRANSMISSION RATE ADJUSTMENT SECTION
313
SESSION DISCONNECTION SECTION
200: COMMUNICATION NETWORK
101 : DATA RECEPTION APPARATUS
202
CONTROL INFORMATION TRANSMISSION/ RECEPTION SECTION
103
TCP TRANSMISSION/ RECEPTION SECTION
204
RECEIVER REPORT TRANSMISSION INTERVAL DETERMINATION SECTION
105
RECEIVER REPORT PACKET GENERATION SECTION
107
RTCP TRANSMISSION /RECEPTION SECTION
109
UDP TRANSMISSION /RECEPTION SECTION
106
MEDIA PLAYBACK SECTION
108
RTP RECEPTION SECTION

FIG. 11

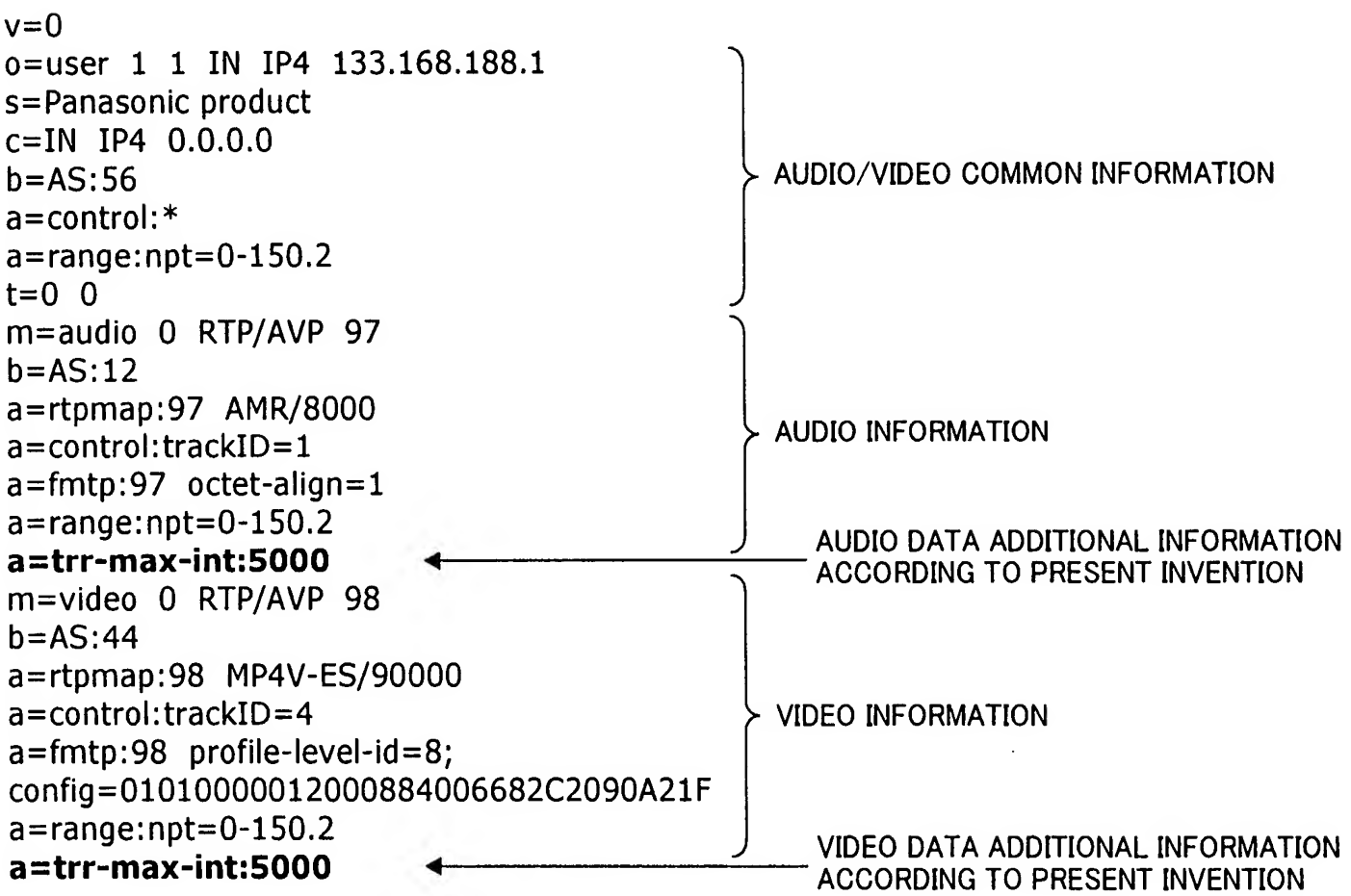

FIG. 12

10/507130